4.6W DUAL AUDIO POWER AMPLIFIER

KIA6283K is an audio power IC with built-in two channels developed for portable radio cassette tape recorder. Because of the parts reduction and SIP (Single In line Package), space merit is remarkable. Thermal shut down protection circuit is built in.

FEATURES

- High Power
  \( P_{\text{OUT}} = 2.5\, \text{W/CH (Typ.)} \)
  \( = (V_{\text{CC}} = 9\, \text{V}, R_{\text{L}} = 4\, \Omega, f = 1\, \text{kHz}, \text{THD} = 10\%) \)
  \( P_{\text{OUT}} = 4.6\, \text{W/CH}(\text{Typ.)} \)
  \( = (V_{\text{CC}} = 12\, \text{V}, R_{\text{L}} = 4\, \Omega, f = 1\, \text{kHz}, \text{THD} = 10\%) \)
- Low popping noise at power ON
- Small Quiescent Current
  \( I_{\text{Q}} = 19\, \text{mA (Typ.)} (V_{\text{CC}} = 9\, \text{V}, V_{\text{IN}} = 0) \)
- Soft Clip
- Built-in thermal shut down protection circuit
- Best for supply voltage 9V, 12V
- Operation supply voltage range : \( V_{\text{CC}} = 6 \sim 15\, \text{V} \)

MAXIMUM RATINGS (\( T_a = 25^\circ\text{C} \))

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>SYMBOL</th>
<th>RATING</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>( V_{\text{CC}} )</td>
<td>20</td>
<td>V</td>
</tr>
<tr>
<td>Output Current (Peak/CH)</td>
<td>( I_{\text{D(peak)}} )</td>
<td>2.5</td>
<td>A</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>( P_{\text{D}} )</td>
<td>12.5</td>
<td>W</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>( T_{\text{op}} )</td>
<td>-20 \sim 75</td>
<td>(^\circ\text{C} )</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>( T_{\text{stg}} )</td>
<td>-55 \sim 150</td>
<td>(^\circ\text{C} )</td>
</tr>
</tbody>
</table>
**ELECTRICAL CHARACTERISTICS**
(Unless otherwise specified, $V_{CC}=9\text{V}$, $f=1\text{kHz}$, $R_g=600\Omega$, $R_L=4\Omega$, $Ta=25^\circ\text{C}$)

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>SYMBOL</th>
<th>TEST CIRCUIT</th>
<th>TEST CONDITION</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiescent Current</td>
<td>$I_{CQ}$</td>
<td>-</td>
<td>$V_{IN}=0$</td>
<td>-</td>
<td>19</td>
<td>45</td>
<td>mA</td>
</tr>
<tr>
<td>Output Power</td>
<td>$P_{OUT(1)}$</td>
<td>-</td>
<td>THD=10%</td>
<td>2.0</td>
<td>2.5</td>
<td>-</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td>$P_{OUT(2)}$</td>
<td>-</td>
<td>THD=10%, $V_{CC}=12\text{V}$</td>
<td>-</td>
<td>4.6</td>
<td>-</td>
<td>W</td>
</tr>
<tr>
<td>Total Harmonic Distortion</td>
<td>THD</td>
<td>-</td>
<td>$P_{OUT}=1\text{W/CH}$</td>
<td>-</td>
<td>0.2</td>
<td>1.0</td>
<td>%</td>
</tr>
<tr>
<td>Voltage Gain</td>
<td>$G_V(1)$</td>
<td>-</td>
<td>$R_f=82\Omega$, $V_{OUT}=0\text{dBm}$</td>
<td>43</td>
<td>45</td>
<td>47</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>$G_V(2)$</td>
<td>-</td>
<td>$R_f=0$, $V_{OUT}=0\text{dBm}$</td>
<td>-</td>
<td>56</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td>Input Resistance</td>
<td>$R_n$</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>30</td>
<td>-</td>
<td>kΩ</td>
</tr>
<tr>
<td>Output Noise Voltage</td>
<td>$V_{NO}$</td>
<td>-</td>
<td>$R_g=10k\Omega$, $BW=20\text{Hz}\sim20\text{kHz}$</td>
<td>-</td>
<td>0.3</td>
<td>1.0</td>
<td>mV$_{rms}$</td>
</tr>
<tr>
<td>Ripple Rejection Ratio</td>
<td>R.R</td>
<td>-</td>
<td>$R_g=600\Omega$, $V_{ripp}=0.2V_{rms}$, $f_{ripp}=100\text{Hz}$</td>
<td>-</td>
<td>54</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td>Cross Talk</td>
<td>C.T</td>
<td>-</td>
<td>$R_g=600\Omega$, $\text{Amp1}\leftrightarrow\text{Amp2}$, $V_{OUT}=0\text{dBm}$, $f=1\text{kHz}$</td>
<td>-</td>
<td>60</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td>Input Offset Voltage</td>
<td>$V_{5V,7}$</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>20</td>
<td>60</td>
<td>mV</td>
</tr>
</tbody>
</table>

**TYPICAL DC VOLTAGE OF EACH TERMINAL ($V_{CC}=9\text{V}$, $Ta=25^\circ\text{C}$)**

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC VOTAGE (V)</td>
<td>8.2</td>
<td>4.5</td>
<td>8.9</td>
<td>0.6</td>
<td>0.01</td>
<td>GND</td>
<td>0.01</td>
<td>0.6</td>
<td>GND</td>
<td>4.5</td>
<td>8.2</td>
<td>$V_{CC}$</td>
</tr>
</tbody>
</table>
* This IC can be used without coupling capacitor (C_N). If volume slide noise occurred by input offset voltage is undesirable, it needs to use the capacitor (C_N).
APPLICATION INFORMATION AND APPLICATION METHOD

1. ADJUSTMENT OF VOLTAGE GAIN
   The voltage gain $G_v$ is obtained as follows by $R_1$, $R_2$ and $R_f$ in Fig. 1.
   \[
   G_v = 20 \log \frac{R_f \cdot R_1 + R_2}{R_f + R_1}
   \]
   When $R_f = 0$  \quad $G_v = 56\text{dB(Typ.)}$
   When $R_f = 82\Omega$  \quad $G_v = 45\text{dB(Typ.)}$
   By increasing $R_f$, reduction of $G_v$ is possible. However, since the feedback increase is liable to produce oscillation, it is recommended to use this at $40\text{dB}$ or over.

2. THERMAL SHUT-DOWN CIRCUIT
   The thermal shut-down circuit is built in for the purpose of preventing the destruction of IC due to the abnormal temperature rise when the heat radiation is insufficient.
   The operation temperature is set at radiation $\text{Fin}$ temperature $175^\circ\text{C(Typ.)}$.
   At this temperature or over the bias is interrupted to prevent the destruction of IC.

3. INPUT STAGE
   The input circuit of this IC is as shown in Fig. 2.
   PNP TRQ1 is provided in the input circuit so as to make its usage possible without the input coupling capacitor.
   However, at pins 5 and 7, max $60\text{mV}$ offset voltage is produced.
   Application after checking volume slide noise is recommended.
   For cutting the volume slide noise, insert the input capacitor $C_{IN}$ in series to interrupt the DC component.

Fig. 1

Fig. 2
4. OSCILLATION PREVENTIVE MEASURES
   For oscillation preventive capacitor C6 and C7 between the output terminal and
   GND, it is recommended to use polyester film capacitor having good
   characteristics for temperature and for high frequency.
   Since the characteristics of the capacitor is liable to be influenced by the temperature,
   use this capacitor after the temperature test to check the oscillation allowance.
   In addition, as the position of the electrolytic capacitor has a remarkable
   influence on the oscillation, connect C10 to VCC at the nearest possible
   position from power GND.
   At using this application with the voltage gain reduced, oscillation is liable
   to be produced. Apply the capacitor after checking enough for its capacity,
   type and mounting position.
   As the oscillation allowance varies according to the printed pattern layout,
   the standard printd board of KEC is recommended to be referred to for design it.

5. INPUT VOLTAGE
   When the excessive signal is input, turning-up is produced in the clip waveform.
   The turning-up point is \( V_{IN} = 300mV_{max} (\text{Typ}) \) : \( V_{CC} = 9V \), \( R_L = 4 \Omega \), \( f = 1kHz \) : Enough care
   must be taken for this phenomenon.